volume of an already existing publication. I feel that it ought to be in some neutral, or non-society journal, to avoid arousing jealousy. If either the Royal or the Physical Society could take the matter up and arrange for, say, an extra half-yearly number or an extra annual volume of the *Phil. Mag.*, the thing could be done.

If they could also at the same time arrange for a prompt translation and republication of important foreign papers, many of us would be grateful; cash has hitherto been the main difficulty, but perhaps with the abundant funds at present available across the Atlantic, we may hope for something large and cosmopolitan in this direction before long from our co-linguists there. I commend this to the notice of the energetic secretary of the Smithsonian Institution. Everything tending to mitigate the miserable evils of the confusion of tongues would be eminently welcome, and whenever the whole earth has again the happiness of being "of one language and of one speech," I trust that that speech will be English.

OLIVER J. LODGE.

THE publication of a digest of the scientific papers which have appeared in the English language during even a limited period would entail serious difficulties. In the first place, the expense of printing would be considerable, and it would also be hardly possible to obtain the services of men competent to perform the task without paying them an adequate fee. In the second place, a satisfactory digest could not be published without the co-operation of the various scientific societies; and everybody who has had any experience as a member of the governing body of any club, society, or other institution is well aware of the difficulty of getting a dozen men, many of whom represent conflicting interests, to agree upon any definite scheme.

Still, I believe that the foundations of a scheme, which would be capable of development, might be constructed on somewhat the following lines:—

In 1889 the London Mathematical Society printed an index of all the papers published in the first twenty volumes of their Proceedings. The authors were arranged in alphabetical order, and their communications according to the dates of publication. This index will no doubt be brought up to date and reprinted, and I shall suggest (if I am then a member of the council) that an index of *subjects* shall also be printed, consisting of two parts viz. pure and applied mathematics, arranged in alphabetical order as regards *subjects*. Now if every scientific society which deals with pure and applied mathematics, or with experimental subjects which are capable of mathematical treatment, would co-operate with the London Mathematical Society in publishing an index of their own papers, arranged, printed, and paged in the same manner, it would be quite easy, by a rearrangement of the type, to print a joint index of all papers on these subjects which have been published, during the last twenty or thirty years, by the societies which co-operate. Each society would bear the expense of printing the original index of its own proceedings; and a proportionate part of the expense of printing and publishing the joint index, together with the profits derived from its sale, would be borne by and received by each society. It will be observed that the above scheme only contemplates a double index arranged according to authors and subjects, and not a *digest*; but every one who has had a little experience in hunting up papers, and also, I may add, law cases, will appreciate the value of such an index.

The editors of the Law Reports always insert under the title of each case a short paragraph in small print, giving an account of the points of law with which the case deals, from which the triennial digest is compiled; and if scientific societies would in future require authors to adopt the same course, the paragraph could be put into the index, and would be invaluable. The head-note need not amount to more than a few lines, and should describe the object of the investigation without entering into more detail than is absolutely necessary.

The various reports of the British Association on the progress of different branches of science contain much valuable information, and some of them might with advantage be printed in the index in a condensed form.

In conclusion, I would suggest that the governing bodies of the different societies should discuss this matter, and that a committee of delegates from those societies, which approve of united action, should be formed. The delegates ought, however, to be practical men well-versed in business, and able and willing to devote their time to the consideration of this question.

A. B. BASSET.

Birds' Methods of Steering.

THE flight of birds still presents several unsolved problems. How they steer, has never been fully explained. With the naked eye or, still better, with a field glass, many of them can be seen to use their tails, lowering the left or right side according to the direction in which they wish to go. This use of the tail as a rudder is much practised by pigeons, jackdaws, rooks, larks, swallows, housemartins, sandmartins, and I believe, by most of our common birds. Gulls let down a foot on one side or the other, and, no doubt, many other web-footed birds do the same. Still a rook or pigeon that has lost his tail manages to steer well, the chief result of the loss being that he cannot stop suddenly, nor float upon the air, but must take rapid strokes with his wings. What other method, then, has the bird of steering? One fact that bears upon this question can be easily observed. When a bird wishes to turn to the left he moves the centre of gravity of his body and flings himself on his left side, the right wing pointing upward and the left downward. How does he throw himself into this position? Most writers say that it is by striking harder with one wing than the other. In turning to the left the right wing would give a vigorous stroke, and so raise the right side of the body more than the left. At first sight it seems as if this explanation could not be the true one, since after a hard stroke the right wing should be lower than the left, which has only given a gentle one, and yet it is the right wing that is raised. But we must not be too hasty in drawing conclusions from this. When the down stroke takes place the wings do not descend far; the body rises so that the end of the wing appears to have described a much greater arc than it has done in reality. If, then, with the right wing a much harder stroke is given than with the left, the right side of the body will at once be raised, and the whole bird will be thrown upon its left side, while the movement of the wing itself may not be enough to be perceptible. If birds are watched as they fly, one wing seems always to be at the same angle to the body as the other, so that a straight line connecting the tips of the wings would pass through the two shoulder joints, or be parallel to a line passing through them. Instantaneous photographs of birds on the wing seem to me to bear this out. One wing may point up and the other down, but that is through the swaying of the whole body to one side or the other. In spite of this there may be an inequality of stroke that escapes detection, and without assuming this it seems on first thoughts difficult to account for the extraordinarily rapid turns made, for instance, by the swallow. But supposing that what appears to be the case is really so, viz., that equal force is put into both wings, there remains another possible explanation of this movement of the centre of gravity to the left or right in turning. If a bird wishes to steer leftwards, he may bend at the waist towards the left. So much has been said about the rigidity of the bird's backbone that its suppleness at a point just anterior to the ilium has been overlooked. I find that a swallow's vertebral column will bend at this point so as to form an angle of 150°; in the case of a kestrel it is 156°, of a tern 155°, of a sandmartin much the same as in the case of the swallow, in the case of a duck 165°; *i.e.* a duck can bend much less at the waist than the other birds mentioned, and you have only to watch ducks on the wing to see that they are very poor steerers. This is but meagre evidence, and, at present, I have not the means of collecting more. Still, as far as it goes, it seems to show that suppleness of waist goes along with the power of swerving rapidly, and, *a priori*, it seems extremely improbable that such a highly acrobatic feat should be performed without calling into play every power that is available. Direct observation can, I fear, afford little help, since the feathers obscure any slight bend in the back. But the habit that many birds have—it can be easily seen in the case of gulls—of turning their heads in the direction in which they wish to go, suggests that it may be by bending the vertebral column at a point where it would be more effective, that they make their turns, just as a skater changes edge and flies off on an opposite curve by swaying the weight of his shoulders across to one side or the other, a change of balance effected by a bend sideways at the waist. It is certain that birds do not depend entirely on movements of the head or neck, since gulls, for instance, may occasionally be seen to turn to the left while looking to the right and *vice versa*, a point which may be made out from instantaneous photographs. I cannot help thinking, then, that a bird avails itself of the suppleness of its waist to alter its balance when it wishes to turn. Whether this is the sole means, or whether at the same time the wings are worked

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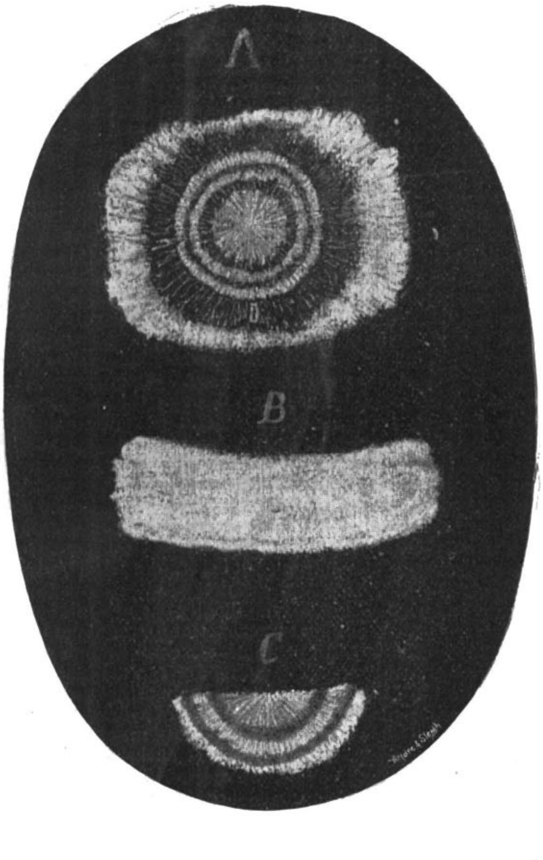
unequally so as to conduce to the same end is difficult to decide. I may add that I have found the required muscles at the waist considerably developed. F. W. HEADLEY.

Haileybury, Hertford, July 6.

Remarkable Hailstones.

ON Saturday afternoon, July 9, a very violent storm burst over Harrogate and its neighbourhood, accompanied by remarkably loud thunder and most brilliant and almost continuous lightning.

At first a little rain fell, but it was soon mixed with small hailstones about the size of peas of the usual form. These were quickly followed by hemispheres of the size and character indicated in Fig. C. After a few minutes they rapidly grew to the size of those shown in Figs. A and B, which are drawn very carefully to actual scale. Most were flattened oval discs, as shown in the two drawings, which exhibit top and side view of one hailstone. I went out myself and measured a good number while they were falling by putting them on a sheet of paper and marking their maximum and minimum diameters. These large stones usually had an opaque spherulitic-like nucleus, followed by two, three, and even a trace of a fourth clear ice shell intervening with opaque ice. Then followed a broad band of clear ice with a few radiating air cavities, finally enclosed in a mass of white granular feathery ice. The number of alternating laminæ seemed to be irregular, and must have varied with that of the different vapour strata traversed by each nucleus. The origin of the type (Fig. A from Fig. C) is very obvious. The quantity that fell was enormous, so that a lawn badly kept was entirely white, with the exception of the longer blades of grass that projected. The damage done in the near neighbourhood must amount to some thousands of pounds, and very few are the houses in this town that escaped without windows being broken. I did not time the duration of the fall, but I think it was about an hour.



5, Princes Square, Harrogate. H. J. JOHNSTON-LAVIS.
July 12.

A Substitute for Ampère's Swimmer.

I HAVE long been dissatisfied with the rules commonly given in order to enable the relation between the direction of a current and that assumed by a magnet in its neighbourhood to be readily brought to mind. It is a small matter, but it causes a great deal of worry to many a student. The vagaries of Ampère's swimmer are "past the wit of man." Prof. Jameson's rule is not bad, but is not really easy to remember; the corkscrew is good, provided that you have a little time to think about it; but I have felt all along that it ought to be possible to devise something simpler than any of these. May I suggest that the following may perhaps be found useful?

If a pen be held in the right hand in the usual way, the penholder may be taken to represent the wire, and the direction of the flow of ink (that is, towards the point of the pen) the direction of the current; if, then, the thumb be stretched a little across the penholder it will represent the magnet, and the thumb-nail its marked or north-seeking pole. The hand may, of course, be twisted round into any position to represent any actual case. The same relation may be still more simply borne in mind by dispensing with the penholder, and merely laying the thumb across the forefinger of the right hand; either of these will then represent the current (flowing towards the finger, or the thumb-nail, as the case may be), the other the magnet.

Whether this is novel I do not know; it is so as far at I am concerned; but I think it is useful. ALFRED DANIELL.

Advocates' Library, Edinburgh, July 13.

The Jelly-fish of Lake Urumiah.

IN Mr. Curzon's recently-published work "Persia and the Persian Question" (vol. i. p. 533), he writes as follows:—"When the wind blows on Lake Urumiah, sheets of saline foam are seen scudding along the surface, and the salt is left upon the shore in a solid efflorescence, sometimes several inches thick. No fish or molluscs live in the waters, whose sole living contents are a species of *small jelly-fish*, which sustain the swans and wild fowl that are occasionally seen."

When Captain F. R. Maunsell read his interesting paper on Kurdistan to the Royal Geographical Society in June last, I asked him whether he could give me any further information respecting this so-called "jelly-fish," to which he was kind enough to reply as follows:—"In reply to your inquiries regarding the existence of a jelly-fish in Lake Urmia, I have been going through my notes, and find that I visited the lake on July 20 at its west shore, not far from the town of Urmia. I bathed in the lake and found the jelly-fish in great numbers along the shores where the water was shallow. It was only about half an inch in diameter, of a greenish-white, almost colourless, with a small black centre. There are said to be no fish or other living creatures in the water, and I did not see any. As you probably know, the lake is extremely salt, more so than the Dead Sea. The specific gravity is given as 1·155, with 21·4 per cent. of salt. The lake is 4,100 feet above the sea level, and has no outlet. There is a British Consul in Tabriz, which is not far from the east shore of the lake, who might obtain a specimen, and would be able to ensure its getting home safely better than any one else. The lake is very shallow compared with its great size, nowhere being more than from thirty to forty feet in depth."

The only instance of a "jelly-fish" or Medusa as yet known to inhabit an inland sea is that of the *Limnocnida tanganjicæ*, recently described by Mr. R. T. Günther (Ann. and Mag. N. H. ser. 6, xi. p. 274 (1893)). It would be therefore of great interest to obtain specimens of the "jelly-fish" of Lake Urumiah and ascertain what it really is.

3, Hanover-square, W., July 17. P. L. SCLATER.

Racial Dwarfs in the Pyrenees.

BEING on the Riviera when I received NATURE of January 26 with Mr. Haliburton's letter on the above subject, I proposed to act on his suggestion, and, on my way back to England, to explore the region indicated. To ensure, however, that the proposed exploration should not be a wild-goose chase, I first entered into communication with all the British consuls and French savants likely to have special knowledge of the subject, and more particularly with M. Cartailhac, director of *l'Anthropologie*, and who resides at Toulouse, "within little more than a

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